

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:
BENOIT CASTEL
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Date of mailing **10 AUG 2004**
(day/month/year)

FOR FURTHER ACTION
See paragraph 2 below

Applicant's or agent's file reference

5504-1167

International application No.

International filing date (day/month/year)

25 March 2004 (25.03.2004)

Priority date (day/month/year)

26 March 2003 (26.03.2003)

PCT/US04/09019

International Patent Classification (IPC) or both national classification and IPC

IPC(7): H01M 8/02, 4/90; C01G 41/02; B01J 23/30 and US Cl.: 429/40, 44; 423/606, 502/182, 305

Applicant

OSRAM SYLVANIA INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US

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Commissioner for Patents
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Form PCT/ISA/237 (cover sheet) (January 2004)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International Application No.

PCT/US04/09019

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International Publication No.
PCT/US04/0

Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims 2-16

YES

Claims 1

NO

Inventive step (IS)

Claims 4-9 and 11-15

YES

Claims 1-3, 10 and 16

NO

Industrial applicability (IA)

Claims 1-16

YES

Claims NONE

NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International Application No.
PCT/US01/019

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claim 1 lacks novelty under PCT Article 33(2) as being anticipated by Angevine et al (U.S. Patent 4,910,181). The reference is directed to a hydrogen bronze catalyst that has the composition H_yWO_3 , where y is about 0.5 (see col. 3, line 10). This is considered anticipatory of the claimed subscript of 0.53. The catalyst is supported on a high surface area material (see col. 3, line 26). Regarding the recitation "for a fuel cell," this represents intended use and is given little weight. Thus, claim 1 is anticipated.

Claims 2 and 3 lack an inventive step under PCT Article 33(3) as being obvious over Angevine et al. in view of Christian et al (U.S. Pre-Grant Publication No. 2002/0111267).

Angevine is applied as stated above. Further, the reference teaches that the catalyst may be supported on "a variety of well known carriers, for example, alumina, kieselgur, zeolitic molecular sieves and other materials having high surface areas" (col. 1, line 28). Further, the reference teaches that the hydrogen bronze comprises at least about 10 wt% of the mixture of the bronze and the support material (col. 3, line 22).

The reference does not expressly teach that the support material may be carbon black, as recited in claim 2.

Christian et al. is directed to tungsten-containing catalyst supported on a carbon black support (see abstract; par. 34). Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Christian indicates that carbon black is an appropriate material for supporting a catalytic material. As such, the artisan would be sufficiently skilled to use such material as the support of Angevine. Additionally, the amount of tungsten in the mixture as recited in claim 3 may be routinely optimized and is also not considered to distinguish over the references.

Claims 10 and 16 lack an inventive step under PCT Article 33(3) as being obvious over Christian et al. in view of Broyde (U.S. Patent 3,507,701).

Christian et al. teach a PEM fuel cell comprising a tungsten-based anode electrocatalyst (see paragraph 25).

The reference does not expressly teach that the cathode also comprises a tungsten-based catalyst, as recited in claim 10.

Broyde is directed to a fuel cell comprising a tungsten-based cathode electrocatalyst (see abstract).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Broyde would motivate the artisan to use a tungsten-based catalyst in the cathode of Christian et al. In column 2, line 20, Broyde teaches that such catalysts are "effective cathodic reduction catalysts." As such, the artisan would be motivated to use a tungsten-based catalyst in the cathode of Christian et al.

Claims 4-9 and 11-15 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the

**WRITTEN OPINION OF THE
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International Application No.
PCT/US0.../2019

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

claimed subject matter. Claim 11 recites a fuel cell comprising $\text{H}_{0.53}\text{WO}_3$ catalysts in the anode and cathode thereof. Angevine et al. teaches this particular catalyst composition, but there is no teaching or suggestion in the reference to use such catalyst in a fuel cell. Claim 4 is directed to a method of making an $\text{H}_{0.53}\text{WO}_3$ catalyst comprising the steps of heating ammonium metatungstate in an inert atmosphere followed by heating in a hydrogen atmosphere. Jacobson et al (U.S. Patent 4,339,424) teaches the processing of ammonium tungstate in an oxygen-containing atmosphere, but does not teach or suggest that the material is treated in hydrogen or that $\text{H}_{0.53}\text{WO}_3$ is formed.

Claims 1-16 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.